

## Distribution of the Dwarf Waterdog (*Necturus punctatus*) in Virginia, with Comments on Collecting Techniques

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The dwarf waterdog, *Necturus punctatus*, is a medium-sized (to 189 mm total length), permanently aquatic salamander (Figure 1) which inhabits streams and rivers of the Atlantic Coastal Plain and the eastern edge of the Piedmont, ranging from the Chowan River drainage in southeastern Virginia to the Altamaha River drainage in southcentral Georgia (Martof et al., 1980; Conant & Collins, 1991; Dundee, 1998; Petranksa, 1998). It is the smallest member of the genus *Necturus*. Although common in the Carolinas (see range map in Dundee, 1998), the distribution of *N. punctatus* near the periphery of its range is very poorly known, with only six records for Georgia (Williamson & Moulis, 1994; J. Jensen, unpubl. data), and, including the four new localities we present herein, eight records for Virginia (Virginia Department of Conservation and Recreation, Division of Natural Heritage [DCR-DNH] database, 1999).

During the 1996 field season we collected specimens of *N. punctatus* at two new localities. These are the seventh and eighth sites documented for this species in Virginia. In this paper we discuss the distribution of *N. punctatus* in Virginia, attempt to clarify several historical records, comment on the size classes and age distribution of our specimens, and provide notes on sampling techniques for this species.

### DISTRIBUTION IN VIRGINIA

Mitchell & Reay (1999) plotted six Virginia localities (three counties) for *N. punctatus*, including

our two collection sites (shown as gray circles on their map). As will be discussed below, only one of the three localities mapped by Tobey (1985) coincides exactly with those of Mitchell & Reay (1999). Dundee's (1998) range map includes four Virginia records. Pague & Mitchell (1987) and Mitchell (1991) recommended *N. punctatus* for the informal category of "Status Undetermined" in Virginia. Dundee (1998) erroneously remarked that this species was considered endangered in Virginia, noting that inadequate sampling was likely responsible for the limited number of records in the state.

Mitchell (1991) stated that *N. punctatus* was known only from Greenville, Prince George, and Sussex counties. However, Tobey (1985) reported it from Brunswick and Dinwiddie counties in addition to Greenville County. His reference to a collection by W. L. (= Leslie) Burger (Mitchell, 1994: 12-13) from Rattlesnake Creek [2.4 km] S of Triplet in Brunswick County apparently is unvouchered (J. C. Mitchell, pers. comm.). The American Museum of Natural History, the repository for most of Burger's herpetological collections from Virginia (formerly at Virginia Tech), lacks specimens of *N. punctatus* from this locality (L. S. Ford, pers. comm.). However, the Virginia Museum of Natural History has a series of 11 *N. punctatus* (VMNH 8377-8387) from Burger's collection which lack data but may be the missing specimens from Rattlesnake Creek. Eight of these specimens have numbered paper tags (1080, 1084, 1088-89, 1092-95) and the jar in which the series is housed contains a small metal disk with the number "31" stamped on it. There is no known associated specimen catalog of Burger's nor did his files contain any notes that reference these field

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Fig. 1. *Necturus punctatus* collected on 22 April 1996 from the Nottoway River, Sussex County, Virginia.

numbers (J. C. Mitchell, pers. comm.). Therefore, the origin of these specimens may never be known.

Virginia Commonwealth University has a specimen (VCU 1311) of *N. punctatus* obtained on 16 July 1974 from Great Creek at County Route 618 [now 763], Price Mill, 4.2 mi (6.7 km) SW Albemarle, thus confirming its occurrence in Brunswick County. The specimen was collected by R. I. Bonn of the U.S. Soil Conservation Service [now = Natural Resources Conservation Service] while sampling fish with a backpack electroshocker in shallow (< 1 m) water of this 6 m wide stream (unpublished fish collection notes provided by R. E. Jenkins). Neither of the Brunswick County records is plotted by Mitchell & Reay (1999).

Cornell University (CU) has two series of *N. punctatus* from Virginia, both of which had incomplete or partially erroneous locality data prior to our investigation. Plausible scenarios regarding more precise collection data for both collections follow. All specimens were collected on 27 March 1949 by a field party led by renowned CU ichthyologist Edward C. Raney (Jenkins & Burkhead 1994: 13-14), who was accompanied by Royal D. Suttkus, Howard E. Evans, and Robert M. Roecker. The *Necturus* specimens were captured incidentally while sampling fish with a small seine (R. E. Jenkins, pers. comm.).

The Dinwiddie County site for *N. punctatus* plotted by Tobey (1985) presumably corresponds to a series of 34 specimens (CU 5466) obtained by Raney's field party at "Rowanty Creek, tributary of Nottoway River, 3.3 mi S Reams Station on [U.S.] Hwy 301." Stinson (1997) convincingly determined that this locality, where 17 species of fish (CU 16879-92, 18965, 53318, 73438; catalogued as Sussex County) and a new crayfish (type locality reported as being in Dinwiddie County; Hobbs, 1951) also were collected, was partially in error. The corrected locality was given as "Rowanty Creek, a tributary of the Nottoway River, Chowan River drainage, at the crossing of U.S. Highway 301, Sussex County, Virginia, 4.8 (air) km south of Carson" (Stinson, 1997). The distribution maps prepared by Jenkins & Burkhead (1994) that include the fish obtained at this site indicate that these authors plotted this locality accurately (i.e., in agreement with Stinson's [1997] correction). However, Mitchell & Reay (1999) misplotted this record in the extreme southern tip of Prince George County (the actual locality is just south of the Prince George-Sussex county line), their only record for this county. Therefore, we conclude that there are no documented records of *N. punctatus* from Dinwiddie or Prince George counties, except as discussed below.



The other collection of *N. punctatus* at Cornell University (CU 5470) consists of six specimens captured with seven species of fish (CU 18600-04, 18629, 30254) in Greensville County at "Three Creek, tributary of Nottoway River, 8.5 mi SW Garrott on [U.S.] Route 301." The town name is a misspelling of Jarratt. This site is actually closer to the City of Emporia (3.7 km NNE jct. Main Street [= U.S. Route 301] and Atlantic Street [= U.S. Business Route 58]) than it is to Jarratt. Both Tobey (1985) and Mitchell & Reay (1999) correctly plotted this locality on their range map for *N. punctatus*.

One locality for *N. punctatus* heretofore unknown to herpetologists exists for the Blackwater River system in Prince George County. Extensive fish collection records provided to DCR-DNH by Robert E. Jenkins of Roanoke College indicate that one *N. punctatus* larva was collected on 4 June 1974 during a 1 h survey by R. S. Lee and DeWitt Smith (employees of a private consulting firm) at the County Route 618 crossing of the North Fork Blackwater River (= Blackwater Swamp), 2.9 km N Disputanta. The specimen was obtained while sampling fish by seine and dip net in 0.3-1 m of water of this mud-bottomed, blackwater stream. The *N.*

*punctatus* specimen was identified the following week by Dr. Jenkins, but it is not currently at Roanoke College and is presumed lost (R. E. Jenkins, pers. comm.). This site ranks as the northernmost locality for *N. punctatus* rangewide. Additional surveys should be conducted at and near this collection site to confirm the continued existence of a population of *N. punctatus*.

There are three collections of *N. punctatus* from the U.S. Route 301 (and adjacent Interstate 95) crossing of Stony Creek near the town of Stony Creek in Sussex County. Two of these were made by William S. Woolcott, a University of Richmond ichthyologist (Jenkins & Burkhead, 1994: 15; Mitchell, 1998) and his students. The Carnegie Museum of Natural History has two specimens (CM 91982-83) collected on 26 October 1966 and the Virginia Museum of Natural History has four additional specimens (VMNH 8333-8336) obtained on 31 October 1984. Another specimen of *N. punctatus* was collected at this site on 18 April 1979 by Robert E. Jenkins and his VCU ichthyology class (VCU 2252; field # REJ 874-B). Jenkins' class sampled with seines (R. E. Jenkins, unpublished field notes) and Woolcott's classes presumably did likewise. This locality is ca. 5 air km S of the Rowanty Creek crossing

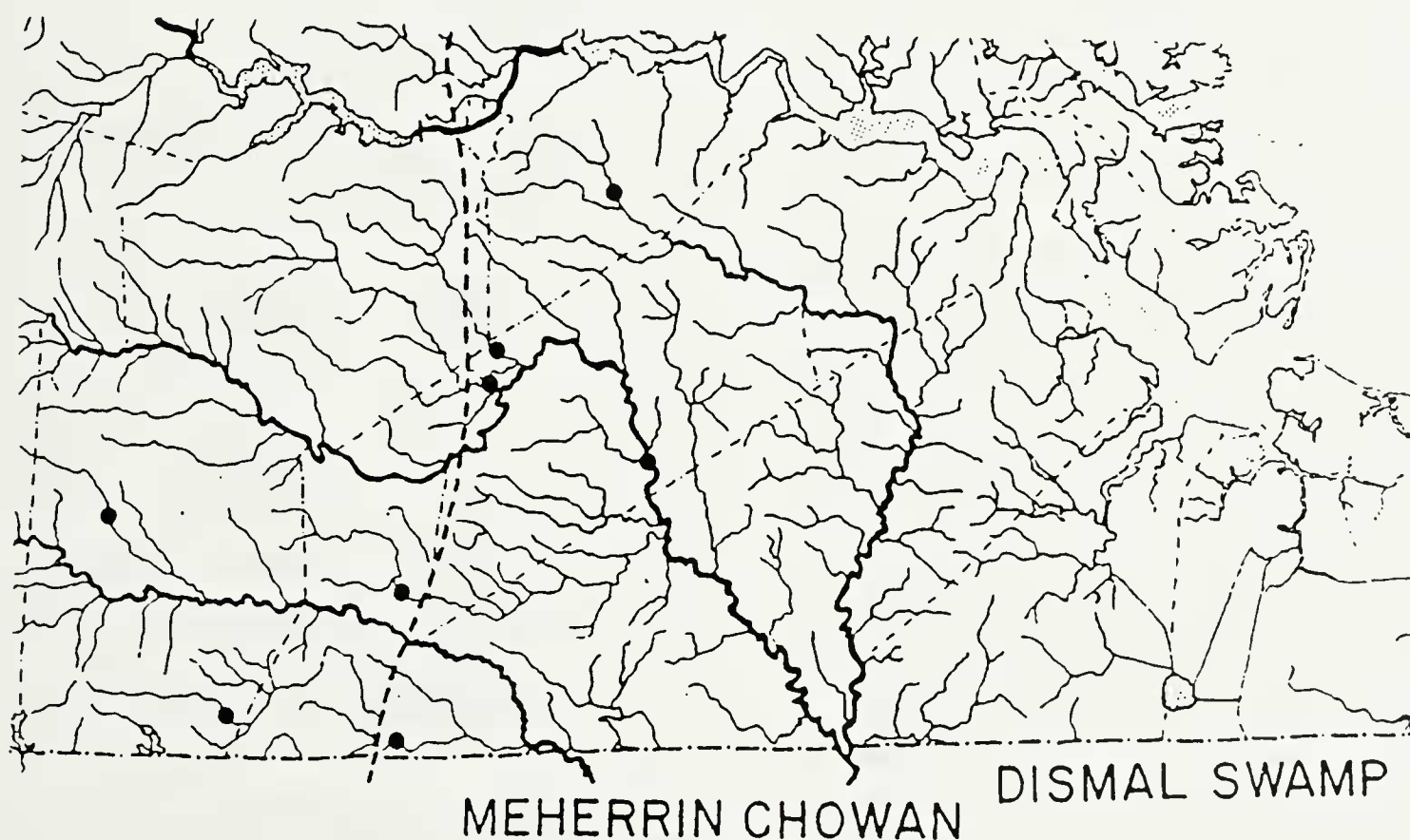


Fig. 2. Distribution of *Necturus punctatus* in Virginia. The dark dashed line delineates the Fall Line separating the Coastal Plain and Piedmont physiographic provinces; lighter dashed lines are county boundaries. Drainages are identified along the bottom margin.

discussed above. Both sites are near the confluence of these respective streams with the Nottoway River. Mitchell & Reay (1999) included the Stony Creek site on their range map, but Tobey (1985) did not. The source of a Sussex County record plotted by Mitchell & Reay (1999) ca. 10-15 km NE of the town of Stony Creek is unknown to us. However, we believe that this is a mapping error, because there is no documented record of *N. punctatus* from this portion of the Nottoway River system (J. C. Mitchell, pers. comm.)

We collected *N. punctatus* on 22 April 1996 in the Nottoway River at County Route 631 (Chub Sandhill Natural Area Preserve), 6.8 air km SSW Littleton in Sussex County. Three weeks earlier (1 April), one of us (DJS) documented this species in Fontaine (Fountains) Creek at County Route 301, 5.6 air km S Skippers in Greensville County. All specimens were captured by dipnetting leafpacks in quiet current at stream margins or from slack backwater pools immediately adjacent to the streams. Eleven of 12 specimens collected in ca. 0.5 h of sampling at the Nottoway River site were in one leafpack. Seven specimens were collected at Fontaine Creek in 2 h of continuous dipnet efforts; five were taken from the same leafpack.

With the locality additions and corrections discussed above, *N. punctatus* is known from Virginia in only the Chowan River drainage, occurring in each of its three major tributary systems: the Nottoway River and three of its tributaries (Rowanty Creek, Stony Creek, and Three Creek); three tributaries of the Meherrin River (Great Creek, Fontaine Creek, and Rattlesnake Creek); and one tributary of the Blackwater River (Blackwater Swamp). Two records are from the Coastal Plain, four sites lie on or very near the Fall Line and there are two outer Piedmont localities in Brunswick County (Great Creek and Rattlesnake Creek) (Fig. 2). In Virginia, *N. punctatus* has been recorded from eight sites in Brunswick, Greensville, Prince George, and Sussex counties.

The precise range of *N. punctatus* in Virginia remains to be determined. Although this species is known only from the Chowan River drainage, most collection sites are well separated, and it is likely more common than currently known. A lack of records for streams like the Blackwater River, a moderate-sized Coastal Plain tributary of the Nottoway River which offers excellent habitat for *N. punctatus*, is probably an artifact of lack of survey efforts targeting this species. Farther west, the Roanoke River drainage should be surveyed for *N. punctatus*. Dundee (1998) plotted two localities in this drainage in North Carolina just below the Virginia state line. Although in the southern portions

of its range *N. punctatus* is known to inhabit lower reaches of coastal drainages almost to tidewater (Martof et al., 1980), in Virginia it has not been collected from any coastal drainages east of the Suffolk Escarpment. A similar distributional gap occurs in North Carolina (Conant & Collins, 1991; Dundee, 1998).

## SIZE CLASSES AND AGE DISTRIBUTION

*Necturus punctatus* requires approximately five years to reach maturity and is thought to live up to 10 years (Folkerts, 1971; Martof et al., 1980). Based on the examination of 50 specimens from South Carolina, Meffe & Sheldon (1987) determined that *N. punctatus* attains sexual maturity at  $\geq 75$  mm SVL. The smallest mature adults in Folkerts' (1971) sample of 76 specimens measured 84 mm (male) and 81 mm (female) SVL. Bishop (1943) mentioned that larvae 28-40 mm total length collected in November were young of the same year, and that larvae 65-88 mm total length collected in December were 1+ years old. Based on these size criteria, our collection from Fontaine Creek includes two adults, three subadults, one yearling, and one young of the year larva (Table 1). Our collection from the Nottoway River contains only juvenile specimens (Table 2).

Table 1. Size (mm) and age class distribution of *Necturus punctatus* collection from Fontaine Creek, Greensville County, Virginia.

SVL	Total	Age Class
92.1	139.0	Adult (female)
80.2	119.4	Adult (female)
70.1	108.0	Subadult
69.7	105.8	Subadult
62.9	94.1	Subadult
49.8	76.2	Yearling
23.4	36.8	Young of year larva

## SAMPLING METHODS

Unlike its larger congeners which are occasionally captured by fishermen, most *N. punctatus* are probably too small to be taken on baited hooks. Gibbons & Semlitsch (1991) stated that electroshocking was an effective method for capturing this species. Meffe & Sheldon (1987) collected *N. punctatus* by electroshocking at 15 of 49 fish sampling stations in



Table 2. Size (mm) and age class distribution of *Necturus punctatus* collection from the Nottoway River, Sussex County, Virginia.

<u>SVL</u>	<u>Total</u>	<u>Age Class</u>
60.6	90.7	Yearling or subadult
58.2	89.2	Yearling or subadult
56.9	87.8	Yearling or subadult
51.3	78.6	Yearling
50.7	76.4	Yearling
48.5	74.5	Yearling
45.0	65.9	Yearling
44.6	66.8	Yearling
43.8	67.3	Yearling
42.3	62.5	Yearling
28.9	44.8	Young of year larva
28.7	43.2	Young of year larva

South Carolina; the mean depth of capture sites was 27.6 cm, maximum depth was 52.9 cm, and mean stream width was 4.4 m. Prior to our very limited sampling, all previous collections of *N. punctatus* from Virginia (excluding the Rattlesnake Creek site for which the collectors and methods are unknown) were obtained by ichthyologists. However, the vast majority of these specimens were obtained with seines rather than by electroshocking. A number of investigators have noted that dipnetting is a successful technique for capturing *Necturus* species (Bishop, 1943; Folkerts, 1971; Braswell & Ashton, 1985; Gibbons & Semlitsch, 1991), and our success at Fontaine Creek and the Nottoway River underscores the value of netting leafpacks. Folkerts (1971) noted that all specimens in his large series from South Carolina were collected with dipnets and seines. Braswell & Ashton (1985) secured large numbers of *N. punctatus* and *N. lewisi* in North Carolina using standard minnow traps baited with chicken liver or shrimp. They captured an average of one *N. lewisi* per 24.5 trap nights, noting that specimens were not captured when water temperatures exceeded 18° C and that capture success was greatest under conditions of increasing stream turbidity and rising water levels.

Like all mudpuppies, the dwarf waterdog is difficult to find during summer. We recommend that future survey efforts to document *N. punctatus* in Virginia be conducted during fall, winter, and early spring and employ dipnet, minnow trap, and electroshocking techniques. Many details of the life history, ecology, and behavior of *N. punctatus* remain poorly known (Petranka, 1998). Additional field surveys are needed to better document the distribution

and natural history of this species in Virginia (Mitchell & Reay, 1999).

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#### LITERATURE CITED

- Bishop, S. C. 1943. Handbook of Salamanders. Comstock Publishing Associates, Cornell University Press, Ithaca, NY. 555 pp.
- Braswell, A. L., & R. E. Ashton, Jr. 1985. Distribution, ecology, and feeding habits of *Necturus lewisi* (Brimley). *Brimleyana* 10: 13-35.
- Conant, R., & J. T. Collins. 1991. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Company, Boston. 450 pp.
- Dundee, H. A. 1998. *Necturus punctatus*. Catalog of American Amphibians and Reptiles 663.1-663.5. Society for the Study of Amphibians and Reptiles.
- Folkerts, G. W. 1971. Notes on South Carolina amphibians. *Journal of the Elisha Mitchell Scientific Society* 87: 206-208.

- Gibbons, J. W., & R. D. Semlitsch. 1991. Guide to the Reptiles and Amphibians of the Savannah River Site. University of Georgia Press, Athens. 131 pp.
- Hobbs, H. H., Jr. 1951. A new crayfish of the genus *Orconectes* from southeastern Virginia (Decapoda, Astacidae). Virginia Journal of Science 2: 122-128.
- Jenkins, R. E., & N. M. Burkhead. 1994. Freshwater Fishes of Virginia. American Fisheries Society, Bethesda, Maryland. 1079 pp.
- Martof, B.S., W. M. Palmer, J. R. Bailey, & J. R. Harrison III. 1980. Amphibians and Reptiles of the Carolinas and Virginia. University of North Carolina Press, Chapel Hill. 264 pp.
- Meffe, G. K., & A. L. Sheldon. 1987. Habitat use by dwarf waterdogs (*Necturus punctatus*) in South Carolina streams, with life history notes. Herpetologica 43: 490-496.
- Mitchell, J. C. 1991. Amphibians and reptiles. Pp. 411-476 in K. Terwilliger (coord.). Virginia's Endangered Species. McDonald & Woodward Publishing Company, Blacksburg, Virginia.
- Mitchell, J. C. 1994. The Reptiles of Virginia. Smithsonian Institution Press, Washington, D.C. 352 pp.
- Mitchell, J. C. 1998. Obituary: William S. Woolcott. Banisteria 11: 58-59.
- Mitchell, J. C., & K. K. Reay. 1999. Atlas of Amphibians and Reptiles in Virginia. Virginia Department of Game and Inland Fisheries, Special Publication No. 1, Richmond, Virginia. 122 pp.
- Pague, C. A., & J. C. Mitchell. 1987. The status of amphibians in Virginia. Virginia Journal of Science 38: 304-318.
- Petranka, J. W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 587 pp.
- Stinson, C. M. 1997. On the type locality of *Orconectes virginianus* Hobbs (Decapoda: Cambaridae). Banisteria 10: 28-29.
- Tobey, F. J. 1985. Virginia's Amphibians and Reptiles: A Distributional Survey. Virginia Herpetological Society, Purcellville, Virginia. 114 pp.
- Williamson, G. K., & R. A. Moulis. 1994. Distribution of Amphibians and Reptiles in Georgia, Vol. 2 - Locality Data. Special Publication No. 3, Savannah Science Museum, Inc., Savannah, Georgia. 712 pp.